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AUTHOR Singh, Balwant
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ABSTRACT

A study examined the effectiveness of IBM's (International Business Machines') "Writing to Read" (WTR) program in teaching kindergartners and first graders to read. Scores of 257 kindergarten students (enrolled in 2 experimental and 2 control schools) on the California Achievement Test were used to determine if the WTR program was more effective than the traditional programs. Writing samples from 272 first-grade students and their scores on the Georgia Criterion-Referenced Test in Reading and the Otis Lennon School Ability Test were used to determine if similar or better results can be obtained by programs which do not use computers to teach reading and writing. Nine first-grade teachers, six kindergarten teachers, and the principals of the two experimental schools completed a questionnaire. Scores of 163 second grade students on the Spelling subtest of the Iowa Tests of Basic Skills and the verbal subtest of the Cognitive Abilities Test indicated whether or not going through the WTR program adversely affects student abilities to spell at a later date. Results indicated that: (1) all teachers liked the "Writing to Read" program and the principals recommended continuation of the program; (2) there were considerable program effects in the areas of visual and sound recognition and no negative effects on student abilities to spell at a later date; (3) there were nearly zero effects for kindergartners in the area of reading; and (4) there were no differences in the writing samples of the groups studied. Findings suggest that spending relatively large sums of money on implementing this program can hardly be justified. (Nine tables of data are included; 22 references are attached.) (SR)

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# IBM's WRITING TO READ PROGRAM: THE RIGHT STUFF OR JUST HIGH TECH FLUFF?

by

BALWANT SINGH

Fulton County Board of Education

786 Cleveland Avenue, S.W.

Atlanta, Georgia 30315

(404) 763-6854

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# IBM's WRITING TO READ PROGRAM: THE RIGHT STUFF OR JUST HIGH TECH FLUFF?

## Introduction

More than one million kindergartners and first graders in many school districts throughout the U.S.A. have gone through IBM's 'Writing to Read' (WTR) program and many more are joining their ranks each year. The program has attracted much attention because of its high-tech approach to the teaching of reading through writing and because of the sponsor's claims of significant increases in student abilities to write and in their achievement as measured by standardized tests.

The curriculum of the WTR program is based upon 42 phonemes (sound units), which can be used to produce various words. J.H. Martin, the author of the WTR program thinks that the phonemic system is simpler and less inhibiting for young children than the requirements to spell in the traditional manner. Students in an IBM classroom (lab) spend about 15 minutes each at three of the five work stations on a given day. Students work with computers to learn phonics at one of these stations and their activities at the work journal station reinforce the phonic skills learned at the computer station. Students are introduced to the "book spelling" at the listening library station. Here they use earphones to listen to tape recorded stories as they follow the story being told, in a book. WTR students use a variety of materials such as clay, crayons, cards etc. at the make words station, to form letters and words they have just learned and play phoneme based games to increase their word building and sound recognition skills. Finally, students learn to write their stories at the writing/typing work station. For additional details, the interested reader should refer to Martin and Friedberg (1986).

According to Slavin (1991) the establishment of 43 labs in Baltimore cost more than $65,000 per lab and this price did not include the money to hire one or more teaching aides or teachers to manage those labs, their maintenance, insurance, consumable materials etc. If a laboratory

serves 120 students on a given day, the per pupil cost of the initial set up alone is more than $540.00. In view of the relatively high cost of the program, it is important to determine if the program is as effective as its proponents claim it to be.

**Review of Research**

Naron and Sierra (1988) used the writing samples of 236 kindergartners and 279 first graders to find out if equal or better results can be obtained through other means. They found that the writing samples of kindergartners taught by teachers trained in the 'Writing Process' (WP) instruction and those of the WTR kindergartners were significantly better than the writing samples of kindergartners in traditional programs; however, they did not find any significant differences between the writing sample scores of WTR and WP kindergartners. They also did not find any significant differences among the three groups at grade one level and concluded that "a similar level of effectiveness may be found from the use of an alternative program that meets the same objective with much lower cost." In a companion study, Sierra and Naron (1988) found that despite scoring significantly higher at the kindergarten level, the 1,338 first grade WTR students did not score significantly higher than their 1,454 non-WTR counterparts in the area of Reading. They however, found that 1,309 WTR kindergartners scored significantly higher on the 1987 tests than the 1,443 non-WTR students. Sledge (1987) found that the WTR kindergartners scored significantly higher than the comparison group on measures of visual discrimination and comprehension; however, no differences were found on tests of Alphabet Knowledge, Initial and Final Sounds, Rhyming, Space and Location, Verb Tense, Sentence Sense, Context and Reading Terminology. Murphy and Appel (1984) reported that kindergarten students in WTR classrooms did significantly better on Standardized tests of reading than their peers in non-WTR classrooms. According to Krendl and Williams (1990) most researchers agree with the conclusion that the WTR is less effective for first graders than kindergartners, in the areas of reading and writing.

Murphy and Appel (1984) reported parent concerns about the possible adverse effects of going through the WTR program, on children's ability to spell at a later date; they had noted those concerns during their formative evaluation of the WTR program, in the 1982-83 school year. In view of that, Murphy and Appel asked WTR and non-WTR kindergartners and first graders, to spell ten selected words but found no differences between the performances of the two groups. They concluded that any initial problems the students may have had were self corrected, while learning to spell in the traditional manner. However, to the knowledge of this writer, no study has been undertaken to determine if learning to spell phonetically while in the WTR program, hinders student ability to spell in the traditional manner, while in grade two and beyond. Because some parents continue to express the said concern even now, we decided to address that issue also in this investigation. Details of other research on the effectiveness of the WTR can be found in two critiques (Freyd and Lytle, 1990 and Krendle and Williams, 1990) and a review by Slavin, 1991.

**Purpose**

This study was designed to address a variety of concerns about the 'Writing to Read' program. Scores of 257 kindergarten students on the California Achievement Test (CAT) were used to determine if the WTR program is more effective in teaching kindergartners to learn to read than the traditional programs. Writing samples of 272 students in grade one and their scores on the Georgia Criterion-Referenced Test in Reading and the Otis Lennon School Ability Test (OLSAT) were used to determine if similar or better results can be obtained by programs which do not use computers to teach reading and writing. Teacher and principal opinions were also invited to determine the effectiveness of the program. Scores of 163 grade two students on the Spelling sub-test of the Iowa Tests of Basic Skills (ITBS) and the verbal sub-test of the Cognitive Abilities Test (CogAT) were used to find out if going through the WTR program adversely affects student abilities to spell, at a later date.

**Method**

One Control school was selected for each of the two experimental schools on the basis of percentages of students on free or reduced lunch and proximity to the experimental school. The Meadows and the Kathleen Mitchell Elementary Schools had seemed to be the best choices for this purpose but the former did not have kindergarten classes; therefore, we decided to use it as one of the control schools for the grade one study and selected Sandtown Elementary (our next best choice) for the kindergarten investigation.

**Analyses and Results**

Kindergarten Data: All kindergarten students in the two experimental and two control schools, for whom the CAT scores were available, were included in this study. **Table 1** shows (among other things) the distribution of the 257 students by schools and programs. Normal Curve Equivalent (NCE) scores of students, on the Reading Total, Language Expression, Mathematics, Visual Recognition and Sound Recognition sub-tests of the CAT were used as dependent variables in a one way multivariate analysis of variance. **Table 2** shows the results of the analyses carried out. It can be seen in Table 2 that there are significant differences between the CAT scores of students in the experimental and control groups.

**TABLE 2**

**RESULTS OF MANOVA OF NCE SCORES ON THE CALIFORNIA ACHIEVEMENT TEST**

| | | |
|---|---|---|
| WILK'S LAMBDA | = | .80 |
| APPROXIMATE F | = | 12.49 |
| DEGREES OF FREEDOM | = | 5 AND 251 |
| P | = | .00 (significant) |

The results of the univariate F tests **(Table 3)** show that the differences between the two groups are significant in the areas of Language Expression and Visual and Sound Recognition Skills. However, there are no significant differences in the achievement of the two groups in the areas of Reading and Mathematics. While we did not expect any differences in the area of Mathematics,

**TABLE 1**
**SCHOOL CHARACTERISTICS AND SAMPLE SIZES**

| | EXPERIMENTAL SCHOOLS | | | CONTROL SCHOOLS | | | | |
|---|---|---|---|---|---|---|---|---|
| | MOUNT OLIVE | SEABORN LEE | LOVE NOLAN | THE MEADOWS | SANDTOWN | KATHLEEN MITCHELL | | |
| Type of Experimental Program | IBM's Writing To Read | IBM's Writing To Read | Individualized Language Arts | NOT APPLICABLE | NOT APPLICABLE | NOT APPLICABLE | | |
| Percent on Free or Reduced Lunch | 40% | 66% | 22% | 41% | 78% | 56% | | |
| Total Enrollment: | 379 | 532 | 589 | 573 | 376 | 478 | | |
| | | | | | | | | TOTAL |
| KINDERGARTEN # of Students in the study | 58 | 84 | NA | NA | 44 | 71 | | 257 |
| GRADE ONE # of Students | 57 | 60 | 45 | 58 | NA | 52 | | 272 |
| GRADE TWO | | | | | | | | |
| # of Students without the WTR experience . | 24 | 52 | NA | NA | NA | NA | SUB-TOTAL 76 | |
| # of Students with WTR experience as first graders | 12 | 46 | NA | NA | NA | NA | 58 | |
| # of Students with WTR experience as kindergartners and first graders | 29 | NA | NA | NA | NA | NA | 29 | |
| Grade Two Total: | | | | | | | | 163 |
| TOTAL: | | | | | | | | 692 |

the finding of no differences in the area of Reading is at variance with the claims of the proponents of the WTR program but supports the results of The Metropolitan Public Schools Study (see Freyd and Lytle 1990 page 87).

**TABLE 3**

**RESULTS OF UNIVARIATE F TESTS**

| DEPENDENT VARIABLE | SUM OF SQUARES | F* | P |
|---|---|---|---|
| Reading | 3.09 | .01 | .92 |
| Language Expression | 1896.61 | 6.04 | .02 (significant) |
| Mathematics | 567.42 | 1.38 | .24 |
| Visual Recognition Skills | 9444.13 | 20.93 | .00 (significant) |
| Sound Recognition Skills | 2407.33 | 7.41 | .01 (significant) |

* **Degrees of Freedom (1,255)**

The effect size .01 for Reading **(Table 4)** is in line with the reported median of the five school district studies reviewed by Slavin (1991) but is much lower than the median for the ETS studies. However, the WTR program effect sizes of .57 and .35 for Visual and Sound Recognition skills respectively show that the program is much better than the traditional programs, in helping children learn those skills. These findings partly support Sledge (1987) who had found WTR kindergartners to be significantly better than their non-WTR counterparts, on the Visual discrimination and comprehension sub-test scores of the Tests of Basic Experiences.

It is interesting to note that the students in the traditional programs did significantly better in the area of Language Expression than the students in the WTR program. There are two plausible reasons for this. First, the WTR program and related activities might have been so time-consuming that the teachers did not have enough time to teach the Language Expression Skills covered by the test. Second, the teachers might have been purposely devoting their time to the

TABLE 4

MEANS AND STANDARD DEVIATIONS OF NCE SCORES
AND PROGRAM EFFECT SIZES *

| SUB-TESTS USED | EXPERIMENTAL (WTR) GROUP (142) ** | | CONTROL GROUP (115) ** | | EFFECT SIZES |
|---|---|---|---|---|---|
| | MEANS | STANDARD DEVIATIONS | MEANS | STANDARD DEVIATIONS | |
| READING | 40.25 | 19.34 | 40.03 | 16.16 | 0.01 |
| LANGUAGE EXPRESSION | 39.94 | 18.23 | 45.40 | 17.09 | -0.32 |
| VISUAL RECOGNITION | 67.30 | 21.17 | 55.10 | 21.33 | 0.57 |
| SOUND RECOGNITION | 53.42 | 24.38 | 45.28 | 23.12 | 0.35 |
| MATHEMATICS | 51.25 | 20.36 | 54.23 | 20.16 | -0.15 |

* Effect Size = $\frac{\text{Experimental Group Mean Minus Control Group Mean}}{\text{Control Group Standard Deviation}}$
(see Slavin 91)

** Number of Students

10/8/91 T \DEPT\PRD\SINGH\WRITING5

teaching of other subjects because they had felt that the WTR experience will also take care of the Language Expression Skills.

**Grade One Data:** As in the case of the kindergarten study one control school was selected for each of the two experimental schools, on the basis of percentages of students on free or reduced lunch and proximity to the experimental schools. In addition to the selection of the said control schools, another school was selected for comparison purposes because it uses the Individualized Language Arts Program developed by the Weehawken Board of Education and the New Jersey Department of Education. It should be pointed out here that we were not particularly interested in comparing the 'Writing to Read' program with the Individualized Language Arts Program per se. The latter just happened to be in place in one of our elementary schools at that time and had seemed to be suitable for use as an adversary to the former because it does not call for the use of computers to teach language arts. Table 1 also shows the distribution of the 272 grade one students who had participated in this study.

All grade one students in the experimental and control schools were asked by their teachers to write the story about the 'Magic Hat' as per directions in the IBM Evaluation Manual. If we received more than 60 writing samples from a school, 60 were selected at random for scoring and the rest were placed in a pool for use in training three Fulton County elementary school teachers as scorers, as per guidelines in the IBM Evaluation Model; however, if we received 60 writing samples or less from a school, all of those were retained for scoring. None of the teachers selected and trained in scoring the writing samples, was from the five schools used in this study. Each sample was scored blind by two teachers independently. Writing samples for which the scores were two or more points apart (out of a total of six) were evaluated by the third teacher and the score assigned by that teacher was used in further analyses of the data. For all other writing samples, the averages of the scores assigned by the two teachers were used.

A rough index of socioeconomic status (recipients of free or reduced lunch and non recipients of lunch subsidy) and the School Ability Index (SAI) scores on the Otis-Lennon School Ability Test were used as covariates in a treatments by race analysis of covariance of the writing sample scores. **Table 5** shows the results of such analyses and it can be seen in that table that the main effects due to treatments and race, and the treatments by race interaction are not significant. It seems therefore, that using the 'Writing to Read' program is not any better than other ongoing instructional programs, as far as teaching students to write is concerned, and this finding is true for students of each of the two races (black and white) studied. Besides, the program effect size in the area of writing, for a relatively inexpensive program (Individualized Language Arts), is at least as high as the effect size for the WTR program (see Table 7). It should be pointed out here that the inter-rater reliability (.62) for the writing sample scores did not turn out to be as high as the author would have liked it to be and although he considers the said reliability to be high enough for making decisions about groups, he decided to study the IBM program's effects on reading (as measured by the Georgia State Criterion-Referenced Tests) also, just to make sure that his tentative conclusion of no program effects was not due to the relatively low reliability of the writing test scores.

**Table 6** shows the results of the analysis of covariance of the reading scores with the lunch subsidy status and the SAI scores on the OLSAT as covariates. The main effects due to treatments are significant but the main effects due to race and the treatments by race interaction are not significant (see Table 6). Because the differences among the IBM program, the Individualized Language Arts Program and the control group are significant, the means and adjusted means of reading scores for the three groups **(Table 7)** were examined. It can be seen in Table 7 that the means and adjusted means of scores on the Georgia State Criterion-Referenced Test in reading are the highest for the students in the Individualized Language Arts Program; they are the lowest for the students in the control group. Thus the students in the 'Writing to Read' program did better in Reading (effect size .28 - see Table 7) than the students in the control group but they did

**TABLE 5**
**ANALYSIS OF COVARIANCE OF WRITING SAMPLE SCORES**

| SOURCE OF VARIATION | SUM OF SQUARES | DEGREES OF FREEDOM | F | P |
|---|---|---|---|---|
| Covariates (SAI and Lunch Subsidy Status) | 38.74 | 2 | 20.81 | 0.00 |
| Main Effects Due to Treatments | 1.82 | 2 | 0.98 | 0.38 |
| Main Effects Due to Race | 0.34 | 1 | 0.18 | 0.83 |
| Treatments by Race Interaction | 0.65 | 1 | 0.69 | 0.41 |
| Residual | 236.43 | 254 | | |
| TOTAL: | 278.25 | 261 | | |

**TABLE 6**
**ANALYSIS OF COVERIANCE OF CRITERION-REFERENCED TEST SCORES IN READING**

| SOURCE OF VARIATION | SUM OF SQUARES | DEGREES OF FREEDOM | F | P |
|---|---|---|---|---|
| Covariates (SAI and Lunch Subsidy Status) | 64504.32 | 2 | 95.2 | 0.00 |
| Main Effects Due to Treatments | 3827.44 | 2 | 5.67 | 0.00 |
| Main Effects Due to Race | 617.39 | 1 | 0.91 | 0.40 |
| Treatments by Race Interaction | 144.01 | 1 | 0.43 | 0.51 |
| RESIDUAL | 85765.80 | 254 | | |
| TOTAL | 155626.37 | 261 | | |

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TABLE 7

MEANS AND ADJUSTED MEANS OF READING SCORES
AND PROGRAM EFFECT SIZE FOR READING AND WRITING

| PROGRAM | NUMBER OF STUDENTS | MEANS | STANDARD DEVIATIONS | ADJUSTED MEANS | EFFECT SIZES FOR READING | EFFECT SIZES FOR WRITING |
|---|---|---|---|---|---|---|
| IBM's "Writing to Read" | 109 | 208.56 | 25.31 | 208.82 | 0.28 | 0.18 |
| Individualized Language Arts | 45 | 217.22 | 24.85 | 211.77 | 0.87 | 0.19 |
| Control Group | 108 | 199.33 | 21.21 | 201.34 | N/A | N/A |

10/10/91 T \DEPT\PRD\SINGH\WRITING3

relatively poorly as compared to the students in the Individualized Language Arts Program (effect size .87). Our findings do not support the claims of the proponents of the WTR that children can learn to write better as a result of going through this program, as compared to going through the traditional programs and it is supported by Naron and Norbert (1987), who had found that there are no differences in the writing samples of students in the 'Writing to Read' program and traditional programs; however, in that study students taught by teachers trained in the 'writing process' instruction did significantly better than the students in the IBM program. In the case of reading, students in the Individualized Language Arts program used in our study did better than the students in the IBM program. The effect size for Grade one Reading in this study (.28) is higher than the medians of the school district studies (- .02) and ETS studies (.12) reported by Slavin (1991) but the effect size for the Individualized Language Arts Program is .87!

**Teacher and Principal Opinions**

All of the nine grade one teachers and six kindergarten teachers at the two experimental schools completed a brief questionnaire (available from the author), as requested. With the exception of one kindergarten teacher, who did not express an opinion, all teachers liked the program and 13 of them reported having received positive feedback from the parents. These teachers believe that the program supports the development of sound/symbol relationships, helps to spell and write words, helps to match upper and lower case letters, provides motivation to read and write, and is a good introduction to computers. Finally, all teachers recommended the continuation of this program at their schools.

The principals of the experimental schools were also asked to comment about the program in writing. According to them at least two days are needed to conduct an on-site workshop for the staff but the cost of such workshops is minimal. The materials and equipment are age appropriate and are organized in an efficient manner. Consumable materials used in the program are reasonable in cost and are no more expensive than the supplementary workbooks often used in

schools. These principals also believe that the teacher aides play a vital role in the smooth operation of the 'Writing to Read' labs, and the program should not be run without the teacher-aides, even though it may be possible to do so. According to one of the principals, the program is an excellent vehicle for public relations and can be used to show what schools are doing to introduce children to the emerging computer technology. The principals are also very supportive of the program and had recommended its continuation in their schools.

**Grade Two Data:** One hundred and sixty-three grade 2 students in the two WTR schools were divided into three groups, viz: students without WTR experience, students with WTR experience as first graders, students with the WTR experience as kindergartners and first graders (**see Table 1**). Because the number of grade 2 students with WTR experience as kindergartners only was very small, they were not included in this study. Students in higher grades were also excluded because a very large majority of them did not have the WTR experience.

Normal Curve Equivalent scores on the Spelling sub-test of the ITBS and the Standard Age Scores on the verbal sub-test of the CogAT administered in the spring of 1987, were used as dependent variable and covariate respectively, in a treatments by sex analysis of covariance of the data. **Table 8** shows the results of the analyses carried out. It can be seen in Table 8 that the main effects due to treatments are significant but the main effects due to sex and the interaction between treatments and sex are not significant. Because the treatment effects are significant, means and adjusted means of scores on the Spelling sub-test of the ITBS were computed. **Table 9** shows the results of those analyses.

The data in Table 9 suggest that the students with the WTR experience did much better in spelling than the students without that experience, even when their scores were adjusted for verbal ability, as measured by the CogAT. It is therefore, reasonable to conclude that learning to spell phonetically, while in the WTR program does not adversely affect student abilities to spell in the

TABLE 8

ANAYLSIS OF COVARIANCE OF THE SPELLING SUBTEST SCORES

| SOURCE OF VARIANCE | SUM OF SQUARES | DEGREES OF FREEDOM | F | P |
|---|---|---|---|---|
| CogAT Verbal | 4864.59 | 1 | 11.18 | 0.00 |
| Main Effects Due to Treatments | 4110.19 | 2 | 4.72 | 0.01 |
| Main Effects Due to Sex | 1049.53 | 1 | 2.41 | 0.12 |
| Treatments by Sex Interaction | 2216.18 | 2 | 2.55 | 0.08 |
| RESIDUAL: | 67461.23 | 155 | | |
| TOTAL: | 79975.31 | 161 | | |

TABLE 9

MEANS AND ADJUSTED MEANS OF NCE SCORES
ON THE SPELLING SUBTEST AND PROGRAM EFFECT SIZES

| PROGRAM | NUMBER OF STUDENTS | MEANS | STANDARD DEVIATIONS | ADJUSTED MEANS | EFFECT SIZES |
|---|---|---|---|---|---|
| Students without WTR Experience | 76 | 48.3 | 22.2 | 49.4 | N/A |
| Students with WTR Experience as First Graders | 58 | 61.9 | 23.1 | 60.5 | 0.6 |
| Students with WTR Experience as Kindergartners and First Graders | 29 | 58.8 | 17.9 | 58.6 | 0.46 |

traditional manner, at a later date. It should be pointed out here that during the 1986-87 school year, all grade two students in this district were part of a district-wide effort to raise test scores; however, in our opinion, that effort is not likely to have influenced the students in the three groups differently. Although, the findings of this study are limited to the population studied, they are in agreement with the findings of Murphy and Appel (1984). The reading program effect sizes for the five multiyear studies reviewed by Slavin (1991) range from -0.27 to .20; however, the effect size in spelling in this study for second graders who were in the WTR program as first graders only, is .6 (see Table 9) and it is .46 for students who were in the program as kindergartners and first graders. It is interesting to note that the program effect size for students who were in the program for two years is lower than the effect size for students who were in the program for one year only.

**Discussion**

The teachers and principals of schools with WTR program like the program and report having received positive feedback from parents and students. Thus, this finding of our study supports the claims of the proponents of the program and those of researchers such as Deboe et al (1984) and Moilanen (1986). However, analyses of data for kindergartners and first graders in our study revealed some interesting results. We did not find any significant differences between the WTR kindergartners and their non-WTR counterparts in the area of Reading but found the WTR students to be significantly better than the non-WTR students in the areas of Visual Recognition and Sound Recognition. We also found the non-WTR kindergartners in our study to be significantly better than the WTR students in the area of Language Expression. Thus, our findings are at variance with Sierra and Naron (1988), who had found the WTR kindergartners to be significantly better than the non-WTR kindergartners on the Reading sub-test of the Iowa Tests of Basic Skills. We did not find any differences among the writing samples of first graders in the three groups (WTR, ILA and traditional) in our study. That finding is in agreement with Naron

and Sierra (1988) who had found that there are no differences among the writing samples of first graders in the WTR, WP (Writing Process) and traditional programs.

According to Krendl and Williams (1990) students in the WTR program receive the same instruction as the students in the traditional programs but they also spend one hour per day in the WTR lab. Besides they have more opportunities for one to one instruction as a result of lower student-instructor ratio. The WTR students participate in a program which is highly visible to other students, teachers, administrators and parents. In spite of the said advantages and the high cost of initial set up, the results are not as clearly in favor of the WTR program as one would expect them to be.

The results of this study are mixed. We have observed considerable program effects in the areas of Visual and Sound Recognition. We also did not observe any negative effects on student abilities to spell at a later date, as a result of going through this program; however, program effects for kindergartners were nearly zero in the area of Reading and there were no differences in the writing samples of the three groups studied. In view of the fact that relatively inexpensive and less well-known programs such as the one used in this study and the 'Writing Process' instruction program used by Sierra and Naron (1988), have produced better results in the areas of Reading and Writing, the spending of relatively large sums of money on implementing this program, can hardly be justified.

## Conclusion

To sum up, the 'Writing to Read' program is the only one of its kind on the market and utilizes the immensely popular computer technology to teach children to read and write, and seems to have become a conversation piece for educators, parents, and even newspaper reporters. The program has also attracted the attention of politicians, including at least two state governors. The governor of Mississippi mandated state-wide implementation of the program and the governor and the

legislators of the state of Louisiana have recommended the adoption of the program, to its schools. However, in our opinion it is not cost effective. Further research to determine the effectiveness of the program, as compared to other programs is recommended.

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